

WHAT IS CLAIMED IS:

1 1. A substrate processing chamber having at least one component
2 bearing a rare earth-containing coating bound to a parent material by an intervening
3 adhesion layer, such that the component exhibits resistance to etching in a plasma
4 environment.

1 2. The substrate processing chamber of claim 1 wherein said rare
2 earth-containing coating is selected from the group of Yttrium fluoride, Yttrium oxides,
3 Yttrium-containing oxides of Aluminum, Erbium oxides, and Neodymium oxides.

1 3. The substrate processing chamber of claim 1 wherein the
2 component is selected from the group comprising a chamber liner, a chamber dome, a
3 chamber wall, a cover plate, a gas manifold, a faceplate, a substrate support, and a
4 substrate support/heater.

1 4. The substrate processing chamber of claim 1 wherein the
2 adhesion layer comprises a graded subsurface layer of rare earth material formed in the
3 surface of the parent material.

1 5. The substrate processing chamber of claim 4 wherein the
2 adhesion layer comprises a subsurface rare earth layer resulting from a changed energy
3 of bombardment during introduction of rare earth material into the parent material
4 through an IBAD process.

1 6. The substrate processing chamber of claim 4 wherein the
2 adhesion layer comprises a subsurface rare earth layer resulting from a changed
3 implantation energy during introduction of rare earth material into the parent material
4 through a MEPIIID process.

1 7. The substrate processing chamber of claim 1 wherein the parent
2 material comprises aluminum nitride or aluminum oxide.

1 8. A method for treating a parent material for corrosion resistance
2 to plasma comprising:
3 forming an adhesion layer over a parent material; and

4 forming a rare earth-containing coating over the adhesion layer.

1 9. The method of claim 8 wherein the rare earth-containing coating
2 is formed by deposition of rare earth-containing material.

1 10. The method of claim 9 wherein rare-earth ions are introduced by
2 conducting reactive sputter deposition in an oxygen-containing ambient.

1 11. The method of claim 8 wherein the adhesion layer is formed by
2 introducing rare earth metals into the parent material at varying energies to form a
3 graded implant layer.

1 12. The method of claim 11 wherein the adhesion layer is formed by
2 an ion bombardment assisted deposition (IBAD) technique employing bombardment of
3 a deposited rare earth layer with inert Argon ions at changed energies.

1 13. The method of claim 11 wherein the adhesion layer is formed by
2 accelerating rare-earth ions at the parent material at changed energies of implantation.

1 14. The method of claim 13 wherein rare-earth ions are accelerated
2 using a MEPIIID ion implanter.

1 15. The method of claim 8 wherein the rare-earth containing coating
2 is formed by exposing a rare earth present on a surface of the parent material to a
3 fluorine ambient.